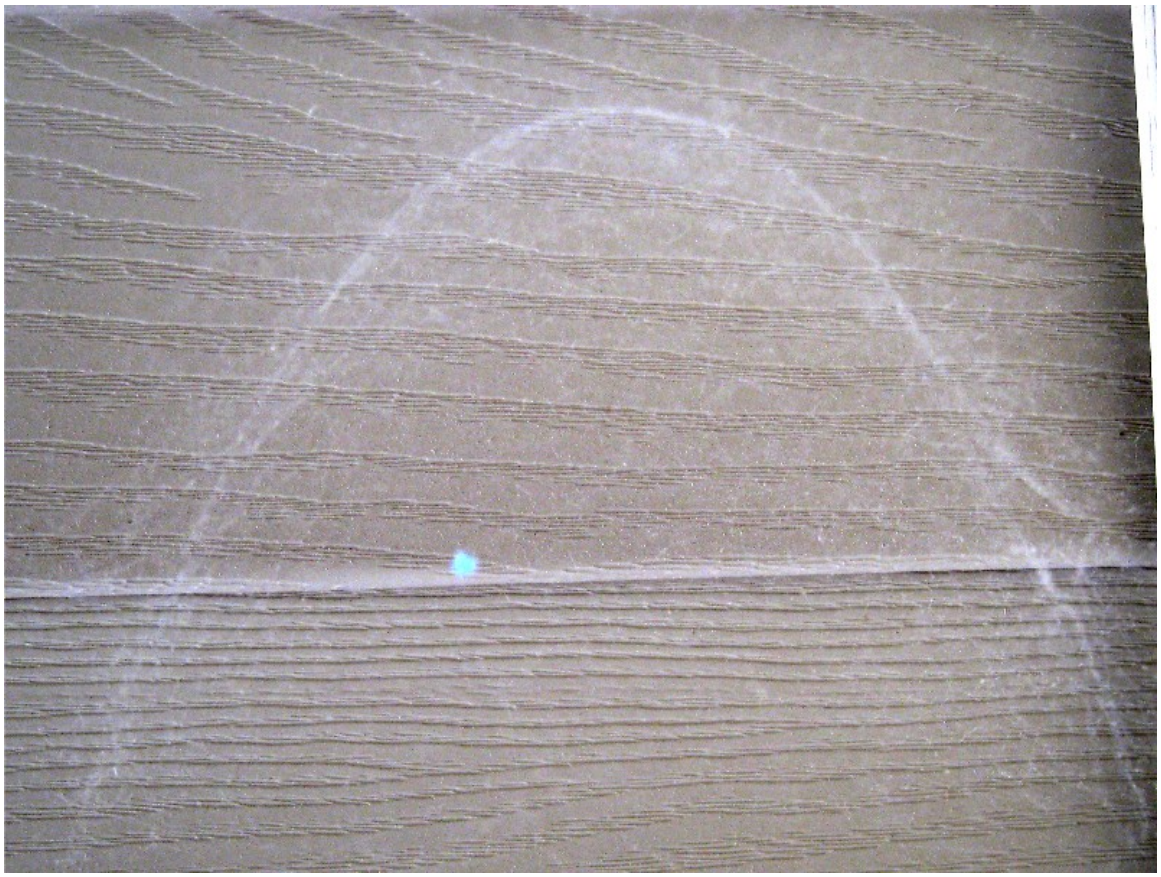
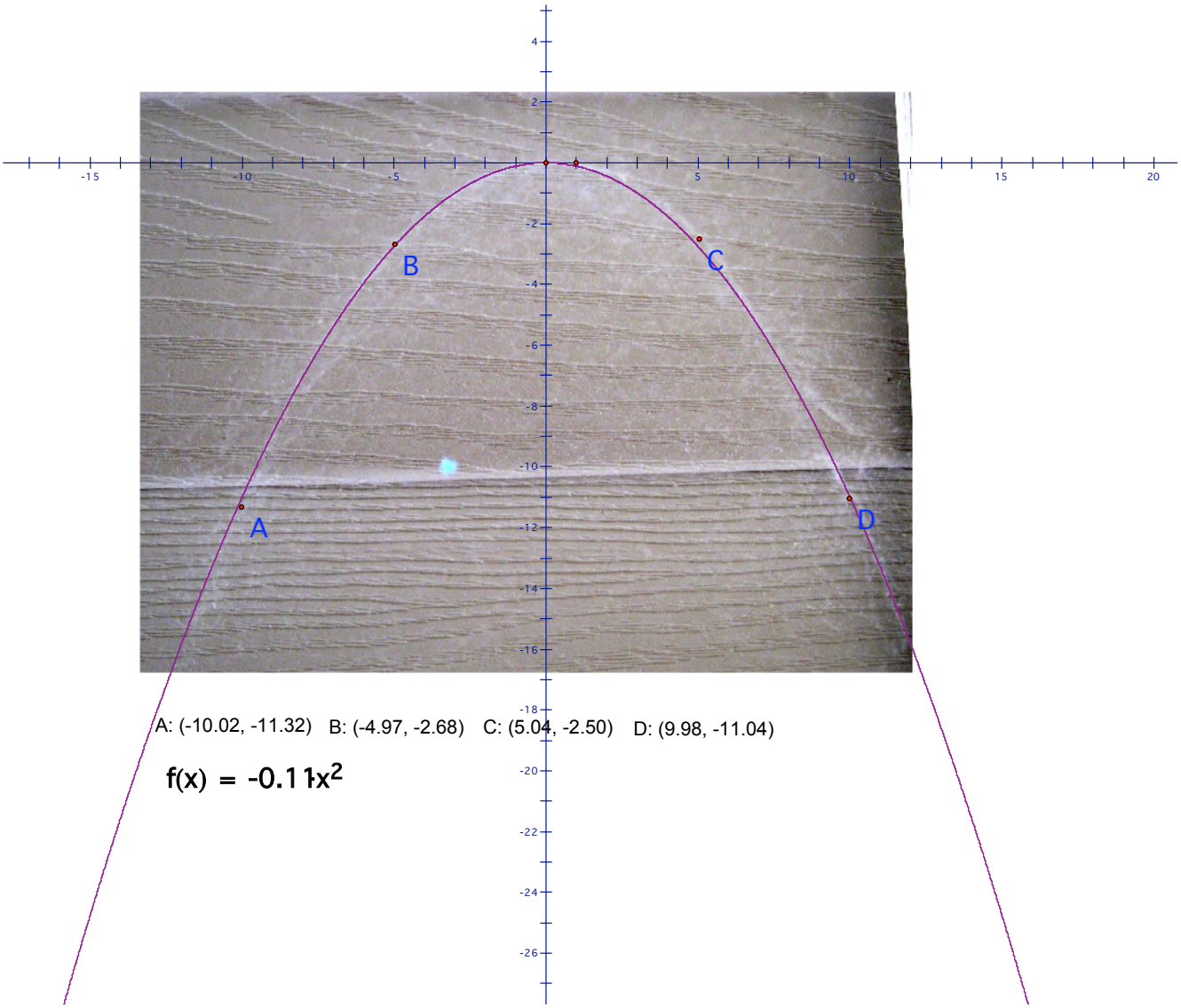
Parabolic Spider Web: The filmy dome spider



This is a photo I took of a *filmy dome spider* web that was taken head on. This is actually a 3-D web that looks like an upside down parabolic cup. I was curious to see if the shape was actually parabolic. Most spider silk will form catenaries, but this inverted shape appeared very parabolic to me. (The blue dot is a speck of dirt caught in the web.)

In the picture on the next page you can see that I was able to fit a curve reasonably well. I used Geometer's SketchPad to plot the points (measure the coordinates) and used some trial and error for the curve after I put in one point value for $y=ax^2$. I put the vertex of the "parabola" in (0,0).

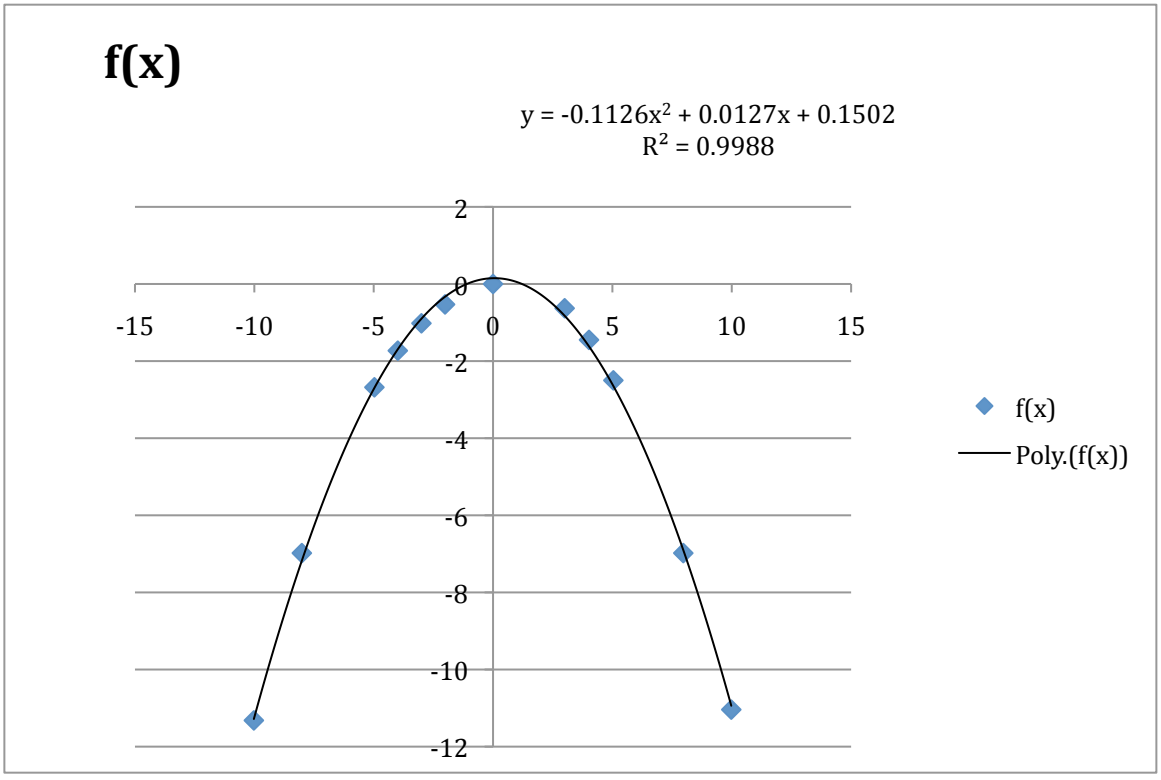

A
B
C
D
A: (-10.02, -11.32) B: (-4.97, -2.68) C: (5.04, -2.50) D: (9.98, -11.04)
f(x) = -0.11x^2

x	f(x)
-10.02	-11.32
-8.01	-6.98
-4.97	-2.68
-3.99	-1.73
-3	-1.02
-2.01	-0.53
0	0
3	-0.63
4.02	-1.45
5.04	-2.5
7.97	-6.98
9.98	-11.04

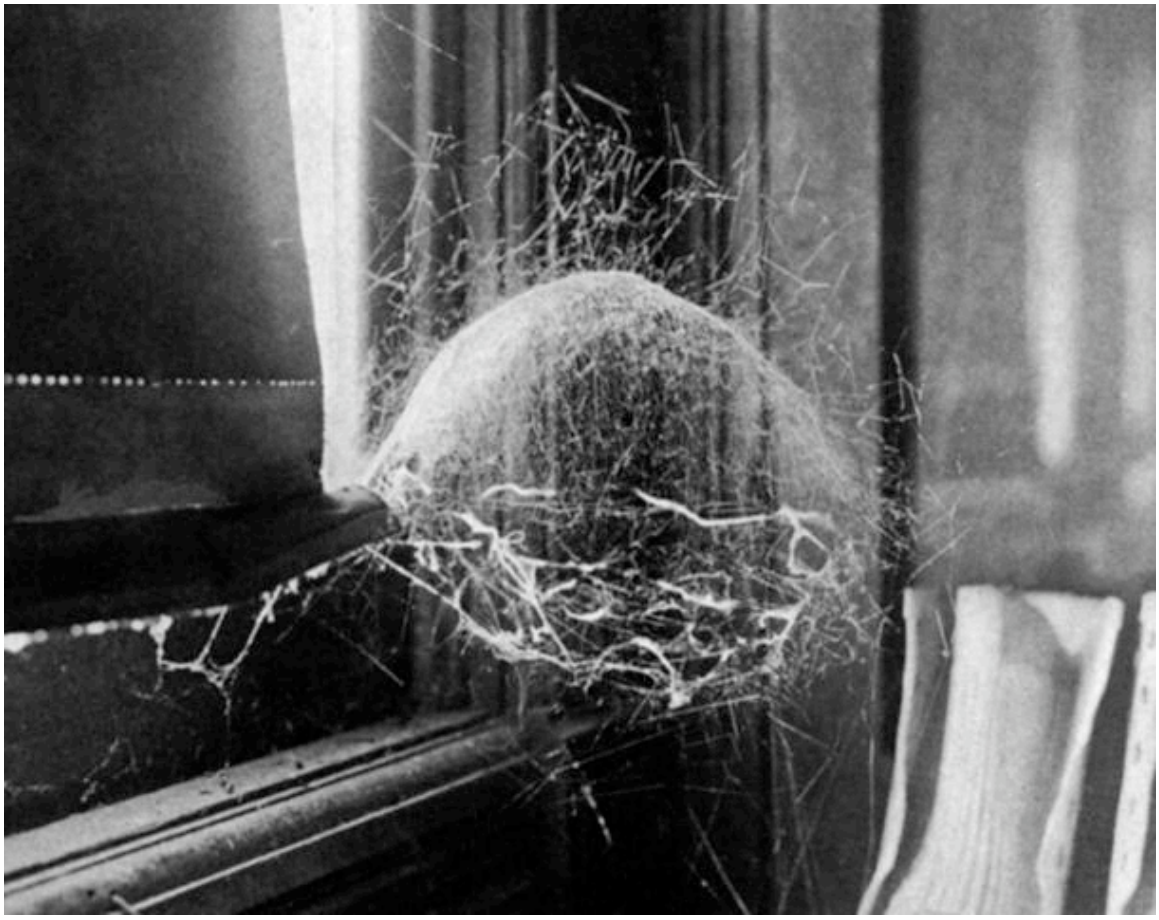
I plotted several more points in Geometer's SketchPad and had it measure the coordinates for me.

I then entered these data in Excel Spreadsheet and fitted a quadratic "trendline."

I also had it calculate the R^2 value, which is nearly 1, which means that the fit is very good.



Filmy Dome Web: From: http://www.pestproducts.com/spider-webs.htm



And http://hartmanprehistoricgarden.com/sa-neriene.html

The Filmy Dome Spider is a very common species that tends to build its web in shady, protected areas. These spiders are only about ¼ inch long. A dorsal view of the female is shown in the photo above.

This species obviously gets its common name from the web in which it lives. There is a sort of dome, along with a jumble of cobwebs all around it. However, it is almost invisible in most lighting situations. When the sun hits it at the right angle, and from a very low perspective, the dome becomes more apparent and the web shines with rainbow hues.

From: http://www.biokids.umich.edu/guides/tracks_and_sign/build/webs/

Sheet web spiders (Linyphiidae) make many kinds of webs that are formed out of sheets of silk. The sheets are wildly jumbled together and don't have many large gaps. There are several kinds of sheet web spiders. *Platform spiders* make thickly interwoven sheets of silk. *Filmy dome spiders* make dome shaped sheets that are secured by a network of silk strings. *Bowl and doily spiders* make very interesting webs. The tops of them look like bowls that are secured by strings to something above them. The bowl appears to be sitting on a doily that is the second part of the web and is attached horizontally. These kinds of webs make very effective booby-traps for unsuspecting insects.

From:
http://bugguide.net/node/view/323460/bgimage

From:
http://www.sergeev.us/pictures/archives/compress/2009/721/24s.htm